STUDY OF PREOPERATIVE AND POSTOPERATIVE BACTERIAL CULTURE IN SINONASAL POLYPOSIS PATIENTS UNDERGOING ENDOSCOPIC SINUS SURGERY

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(OTO-RHINO-LARYNGOLOGY)

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BONAFIDE CERTIFICATE

This is to certify that the dissertation entitled "**STUDY OF PREOPERATIVE AND POSTOPERATIVE BACTERIAL CULTURE IN SINONASAL POLYPOSIS PATIENTS UNDERGOING ENDOSCOPIC SINUS SURGERY"** submitted by **Dr. ANEESH.P.AZEEZ** under my supervision and guidance in partial fulfillment for the award degree of Master of Surgery in Otorhinolaryngology by the Tamil Nadu Dr. M.G.R. Medical University, Chennai is a bonafide record of the work done by him during the academic period 2008 – 2010.

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DECLARATION

I **Dr. ANEESH.P.AZEEZ** **s**olemnly declare that the dissertation titled **"STUDY OF PREOPERATIVE AND POSTOPERATIVE BACTERIAL CULTURE IN SINONASAL POLYPOSIS PATIENTS UNDERGOING ENDOSCOPIC SINUS SURGERY"** has been prepared by me. I also declare that this bonafide work or a part of this work was not submitted by me or any other for any award, degree, diploma to any other University board either in India or abroad.

This is submitted to The Tamilnadu Dr. M. G. R. Medical University, Chennai in partial fulfillment of the rules and regulations for the award of Master of Surgery degree Branch–IV (Oto rhino laryngology) to be held in March 2010.

Place : Madurai **Dr. Dr. ANEESH.P.AZEEZ**

Date :

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INTRODUCTION

Inflammation of sinuses (sinusitis) in one of the most common condition for which a patient seeks advice of a physician. In US, about 30 million patients per year visit Otorhinolaryngology clinics for sinusitis. Nasal polyposis (chronic rhinosinusitis with nasal polyp) are a subcategory of sinusitis and constitutes roughly 2-5% of patients with sinusitis. Although polyps are technically tumours, they are not malignant ones.

Importance of polyps lies in the fact that nose has several vital functions in humans. First and foremost it is an entry point for air that we breath. It also processes the air, as it is an excellent humidifier. Production of mucus allows particulate trapping. It acts as a radiator that warms air. In addition to all this, it is the seat of sense of smell. Finally nose and paranasal sinuses add resonance to voice.

Cause of nasal polyp in still not clear. May causes are hypothesised but not proven beyond doubt. Whatever be the cause, polyp can cause nasal obstruction and affect the quality of life of patients. Hence treatment is a must for any symptomatic nasal polyp.

Results of Walter Messerklinger's "Pathogenesis of inflammatory sinus diseases" are now considered the basis of endonasal endoscopic sinus surgeries.

In German speaking countries, Heinz Stammberger has worked with the "Graz school" to define and advance the technique of ESS. An accurate knowledge of anatomy of lateral nasal wall, paranasal sinuses and skull base are a must for surgical treatment of sinuses disease.

Judicious use of antibiotics are a must for successful outcome of any surgery especially head and neck surgeries. ESS is not an exception. Antibiotics, however do not have a direct impact on the immediate post operative outcome. It's effect is by controlling the bacterial load (both normal and pathogenic), which affects long term outcome. Antibiotics resistance, mainly due to rampant and injudicious use of antibiotics is now a major factor affecting many treatment decisions. Infact it is now proven to be one of important causes for failure in ESS, but not the most common. Hence it was necessary to evaluate the bacterial culture and sensitivity in polyposis cases and to determine the effectiveness of commonly used antibiotics.

AIM OF THE STUDY

1. To identify the predominant bacterial species in nasal cavities of sinonasal polyposis patient, undergoing FESS, preoperatively and post operatively.
2. To ascertain the antibiotic sensitivity of the identified organism
3. To evaluate the efficacy of most commonly used antibiotics in our hospital.

EMBRYOLOGY

The development of the nose and paranasal sinuses needs to be studied in conjunction with the development of the face, in order to have a complete understanding of the subject. Facial development takes place mainly between the 4th and 8th weeks of intrauterine life, during which time a mass of undifferentiated swellings at the head end of the fetus undergo growth and remodeling to form a distinctly recognizable human profile. The face develops from five facial swellings that surround the stomodeum or primitive mouth by the end of the 4th week. The swellings consist of a central unpaired process called the frontonasal process, a pair of maxillary and a pair of mandibular processes. The maxillary and mandibular processes are both sub divisions of the first pharyngeal arch. The frontonasal process is the downward proliferation of the ectoderm over the forebrain.

During the 5th week, a pair of ectodermal thickenings appear on the frontonasal process. These are called the nasal placodes. In the 6th week, the ectoderm in the centre of each nasal placode invaginates to form an oval nasal pit. The raised rims of these nasal pits form the lateral and medial nasal processes. During the 6th and 7th weeks, the maxillary processes on either side increase in size and grow medially. This medial migration of the maxillary processes causes the medial nasal processes to move towards each other. As the maxillary processes

grow medially, they fuse first with the lateral nasal process and then with the medial nasal process. This separates the nasal pits from the stomodeum.

The medial nasal processes fuse with each other to form the intermaxillary process. The central tissues of the intermaxillary process get pushed upwards to form the nasal prominence characteristic of human beings. The intermaxillary process forms the central bridge of the nose and the central portion of the upper lip called the philtrum. At the end of the 6th week, the nasal pits deepen and coalesce to form a single cavity behind the intermaxillary process. This cavity is initially separated from the stomodeum lying below it by a thin membrane called the oronasal membrane. This membrane ruptures during the 7th week to form the primitive choana, which is the opening of the primitive nasal cavity into the stomodeum or developing mouth.

The intermaxillary process grows backward to form the nasal septum. The lateral nasal process enlarge to form the nasal alae. They also grow backwards to form the lateral nasal wall. This developing lateral nasal wall shows multiple anteroposterior elevations, which are finally reduced to three or occasionally four in number. These are the turbinates, which overhang corresponding meatii.

The maxillary processes fuse with the lateral nasal processes. The junction of their fusion is marked by a groove called the nasolacrimal or naso-optic groove. By the 7th week, this groove invaginates into the underlying mesenchyme to form

nasolacrimal duct. The canalization of nasolacrimal duct continues throughout pregnancy and may not be complete till after birth.

The floor of the nasal cavity, which is the hard palate, is formed during the 8th and 9th week. The medial surfaces of the maxillary processes form thin medial extensions called palatine shelves. These shelves first grow downwards on either side of the developing tongue ; but by the end of the 9th week, they rotate upwards into a horizontal position. They then fuse with each other in the midline and with the primary palate anteriorly to form the secondary palate. The secondary palate also fuses with the lower border of the developing nasal septum. The nasal cavity is thus divided into two nasal passages, which open into the pharynx behind the secondary palate through openings called the definitive choanae. The mandibular processes grow medially and fuse in the midline to form the lower lip and jaw.

On day 24, the buccopharyngeal membrane in the depths of the stomodeum ruptures to form a broad, slit like embryonic mouth. The mouth is reduced to its final width during the second month as fusion of the lateral portion of the maxillary and mandibular processes create the cheeks.

At birth, the volume of the cranial vault is seven times the volume of the facial skeleton. This ratio steadily decreases during infancy and childhood. This is mainly as a result of the growth of four pairs of paranasal sinuses and the development of the teeth.

The sinuses develop from invaginations of the nasal cavity that extend into the surrounding bones. The maxillary and ethmoidal sinuses developes in utero during the 3rd and 5th fetal months respectively. The maxillary sinus is in the form of an elongated sac in the neonate. With the eruption of the deciduous teeth, it enlarges to become the three times longer anteroposteriorly and five times greater in height and width. Thus, the floor of the maxillary sinus which is above the floor of the nasal cavity at birth, lies below it in adults. The ethmoid sinuses are small before the age of the two years, then grow rapidly till 6 to 8 years but do not complete their growth until puberty.

Around the second year of life, the most anterior ethmoid cells grow into the frontal bone to form the frontal sinuses. The frontal sinuses are visible on X rays by the seventh year of life. Between the second and fifth years, the most posterior ethmoid cells grow into the sphenoid bone to form the sphenoid sinus. Sphenoid sinuses do not usually develop until fifth year of life.

Growth of the paranasal sinuses not only changes the shape and size of the face in childhood but also adds resonance to the voice in adolescence.

ENDOSCOPIC ANATOMY

Endoscopic anatomy is best studied using a fresh cadaver specimen, which has not being formalinized. This is because the feel of the tissues closely mimics that which is felt during live surgery. However, in the absence of a fresh specimen, a formalinized cadaver will also reveal all the intricacies of anatomy to the avid learner. In learning, endoscopic anatomy, we should try to follow the steps of surgery as closely as in a live patient.

Diagnostic Endoscopy :

A careful and methodical diagnostic endoscopy is the key to understanding anatomical variations, pathological processes and to planning one's approach for surgery. It consists basically of three passes.

1st Pass :

The 0° endoscope (or 30° endoscope) is passed gently along the floor of the nasal cavity between the inferior turbinate and septum without touching either structure.

The septum is studied for any spurs and deviations. The inferior turbinate is

examined for hypertrophy, especially at its posterior end. Any pathology obstructing the posterior choana is noticed. The scope is advanced into the nasopharynx. The posterior wall and roof of the nasopharynx is examined to look for the presence of adenoids. The ipsilateral Eustachian tube and the cleft behind it, ie. The fossa of Rosenmueller, are examined. The contralateral Eustachian tube may also be seen but it is better seen with a 30 degree endoscope, which is advanced into the nasopharynx and rotated. The depths of the fossa of Rosenmueller are best studied by a 30 degree endoscope passed through the opposite nostril. On withdrawing the scope the interior meatus under the free margin of the inferior turbinate. As the scope is being withdrawn through the inferior meatus, the roof of the inferior meatus is studied for the opening of the nasolacrimal duct. This is guarded by a fold of mucous membrane called the Hasner's valve. This can be confirmed by the movement seen in this area on applying pressure near the lacrimal fossa. The scope is withdrawn out of the nostril.

2nd Pass

The scope is passed along the floor up to the posterior choana. It is then moved upward medial to the middle turbinate along the roof of the posterior choana and the anterior surface of the sphenoid. The superior turbinate and meatus are seen. The sphenoethmoidal recess is visualized. It lies between the

superior turbinate laterally and the septum medially. It is bounded above by the base of the skull and is continuous inferiorly with the posterior part of the nasal cavity. The sphenoid ostium opens into the sphenoethmoidal recess 1- 1.5cm above the roof of the posterior choana and a few mms away from the septum. It is very often hidden from view by the superior turbinate, which may need to be partially excised to visualize the ostium. The ostium shows variations in size and shape, being circular, oval and sometimes only pinpoint in configuration. Below the ostium at the roof of the posterior choana is a mesh of blood vessels, which form the Woodruff's plexus. The septal branch of the sphenopalatine artery also runs across the anterior wall of the sphenoid in this region. This pass should be practiced as gently as possible without touching any of the turbinates as it can be quite painful in the live patient.

3rd Pass :

The third pass is made to examine the contents of the middle meatus. The middle meatus can be entered by gently retracting the middle turbinate medially with the Freer's elevator. This may be difficult if the middle turbinate is rigid and may give rise to pain in the live patient.

The second simpler method to enter the middle meatus is to advance the scope posteriorly and roll the scope under the inferior border of the middle turbinate to enter the more roomy posterior part of the meatus. The scope is then

withdrawn from posterior to anterior to view the contents of the middle meatus.

However, if one goes in an anterior to posterior direction one first sees the most anterior one-third attachement of the middle turbinate to the cribriform plate. This arch like attachement has also been called the axilla of the middle turbinate. The olfactory fossa can be examined in this area.

A bulge may be present in the region where the anterior end of the middle turbinate attaches to the lateral wall ; this is formed by an underlying well – pneumatized agger nasi cell. Within the meatus most anteriorly is the curved boomerang shaped uncinate process. A groove may be seen where the uncinate process attaches to the lateral wall. This is the junction of the uncinate process to the lacrimal bone. The area anterior to the uncinate process overlies the lacrimal sac. This area extends downwards in the form of a diffuse ridge to reach a 'peak' in the attachment of the inferior turbinate. This ridge overlies the nasolacrimal duct. The bulge of the bulla is seen behind the uncinate process. The groove between the two ie. The hiatus semilunaris is seen and palpated with a ball point, which enters the infundibulum. A 30 degree scope can be used to inspect the infundibulum with a little manipulation. If the bulla does not reach the skull base the suprabullar recess is visualized and occasionally the anterior ethmoid artery can also be seen.

On retracting the middle turbinate gently, one can see that it turns laterally

behind the bulla to attach to the lamina papyracea. This is the ground lamella.

As the scope is passed further posteriorly, the third or horizontal attachement of the middle turbinate is seen. It forms the roof of the middle meatus. The posterior end of the middle turbinate ends at the level of the roof of the posterior choana. Accessory ostia may be seen in the region of the anterior fontanelle, ie. Anteriorinferior to the anterior end of the uncinate process, or in the posterior fontanelle ie. Above and behind the posterior end of the uncinate process. Accessory ostia are circular and are easily seen unlike the normal ostium which can be ovoid, tunnel like and well hidden by the uncinate process.

The middle turbinate may show different anatomical variations :

- Quite commonly it may be ballooned out due to an air cell enclosed within it. This air cell may be pneumatized from the frontal recess. Agger nasi cell or anterior ethmoids. In such a case the middle turbinate is called the concha bullosa. This balloon like concha bullosa may block the osteomeatal unit and the drainage of the anterior group of sinuses.
- The vertical lamella of the middle turbinate may also be pneumatized from the superior meatus to form the interlamellar cell of Grunwald.
- The middle turbinate may have a paradoxical curve bending laterally towards the middle meatus.

- Occassionally, it may be bifid.
- The ground lamella of the middle turbinate may not attach to the lamina papyracea, but may miss the lamina papyracea, pass inferiorly to it and attach to the lateral wall of the maxillary sinus instead. The maxillary sinus in this case is divided into two parts. The posterior part behaves like a posterior ethmoidal cell because it drains behind the ground lamella of the middle turbinate.
- The lower part of a normally curved middle turbinate may curve far laterally to produce a concavity within it. This concavity is called the turbinate sinus.

The uncinate process is removed by a sickle knife or a backbiting forcep to exose the infundibulum. The maxillary ostium can be seen lying in an oblique or horizontal plane behind the intermediate attachement of the uncinate process. This can be widened posteriorly or anteroinferiorly to view the interior of the sinus with a 30 degree endoscope. The floor of the orbit and the infraorbital nerve can be visualized.

The upper border of the attachement of uncinate process is removed along with any cells present in the frontal recess so as to expose the frontal sinus. The bulla is then perforated and is removed systematically in a lateral direction upto the lamina papyracea and in a superior direction upto the base skull. The posterior wall of the bulla is removed. The retrobullar and suprabullar recesses if present can be

studied. The anterior ethmoidal artery may be seen running obliquely across the base skull. Occassionally the anterior ethmoid artery has a bony mesentry, which attaches it to the skull base.

The ground lamella is then visualized. Its position is confirmed by following the middle turbinate backwards to the point where it turns laterally. The ground lamella is perforated inferomedially to enter the posterior ethmoid cells. Care should be taken to preserve the inferior border of the ground lamella, so as to maintain the stability of the middle turbinate. The posterior ethmoid cells are larger in size as compared to the anterior ethmoid cells. They are removed completely to expose the lamina papyracea laterally, the base of skull superiorly and the superior turbinate medially. The posterior most ethmoidal cell has a pyramidal shape, which tapers to a point posteriorly. The posterior ethmoidal artery may be seen running across the base skull. The sphenoid is opened inferomedially. It is important to note that the bony partition dividing the posterior ethmoids from the sphenoid is sinus appears globular like the inside of a rounded pot as a opposed to the pyramidal shape of the posterior most ethmoidal cell. Another landmark is the ‘maxillary ridge’. This ridge is an imaginary line between the medial and inferior wall of the orbit and extends backwards from the upper border of the maxillary ostium. If this ridge is extrapolated backwards then those cells which open above the level of this ridge are the posterior ethmoid cells.

The cell, which opens below the level of the ridge, is usually the sphenoid sinus.

The sphenoid sinus is opened widely to examine its walls. The lateral wall shows a bulge superiorly which is the optic nerve, below and slightly behind is the bulge of the internal carotid artery. There is a recess, which separates these two structures called the carotico optic recess. This recess may be very deep if the anterior clinoid process is pneumatized. In a well pneumatized sphenoid, the bulge of the pituitary may be seen postero superiorly in the midline. The intersphenoid septum may not be in the midline leading to unequal sphenoid sinuses or a "dominance" of one sphenoid sinus. Intrasphenoid septae may be present and these usually attach to vital structures like the optic nerve and the carotid artery. Dehiscence of the optic nerve or internal carotid artery may be noticed. The surgeon must take care whilst removing polyps from within the sphenoid sinus and also whilst removing septae within the sphenoid sinus.

Occasionally an Onodi cell may grow above the sphenoid sinus, in which case, the optic nerve may be seen in its lateral wall.

The sphenoid sinus can be approached medial to the middle turbinate. The sphenoid ostium is visualized and the anterior wall of the sphenoid is punched downwards to open the sphenoid sinus.

The sphenoid sinus may also be approached by an intermediate route. One can go through the posterior end of the middle turbinate to gain access to the

sphenoethmoidal recess and the normal sphenoid ostium, which can then be widened.

The mucosa over the lacrimal bone can be removed. Suture lines can be seen separating the lacrimal bone from the uncinate process posteriorly and from the frontonasal process of the maxilla anteriorly. The lacrimal bone is removed to expose the lacrimal sac and dissection can be carried out inferiorly to view the nasolacrimal duct.

ANATOMY OF NOSE AND PARA-NASAL SINUSES

Nasal Cavity :

The nasal cavity extends from the external nares or nostrils to the choane, where it becomes continuous with the nasopharynx and is narrower anteriorly than poseriorly. Vertically it extends from the palate to the cribriform plate, being

broader at its base than superiorly where it narrows to the olfactory cleft. The nasal cavity is divided in to two by a septum. Each half has a floor, a roof, a lateral wall and a medial (septal) wall. The floor is concave from side to side, antero-posteriorly flat and almost horizontal. Its anterior three-quarters are composed of the palatine process of the maxilla, and posterior one-quarter by the horizontal process of the palatine bone.

The roof is narrow from side to side, except posteriorly and may be divided into frontonasal, ethmoidal and sphenoidal parts, related to the respective bones. As both the frontonasal and sphenoidal parts of the roof slope downwards, the highest part of the nasal cavity relates to the cribriform plate of the ethmoid which is horizontal.

Nasal Septum :

The nasal septum is composed of a small anterior membranous portion, cartilage and several bones : the perpendicular plate of the ethmoid, vomer and two bony crests of the maxilla and palatine. The cartilaginous portion is composed of a quadrilateral cartilage with a contribution from the lower and upper lateral alar cartilages forming the anterior nasal septum.

The perpendicular plate forms the superior and anterior bony septum, is continuous above with the cribriform plate and crista galli and abuts a variable amount of the nasal bones (Lang, 1989e). The vomer forms the posterior and

inferior nasal septum and articulates by its two alae with rostrum of the sphenoid, thereby creating the vomerovaginal canals which transmit the pharyngeal branches of the maxillary artery. Occasionally the sphenoid sinus may pneumatize the vomer. The inferior border of the vomer articulates with the nasal crest formed by the maxillae and palatine bones. The anterior border articulates with the perpendicular plate above and the quadrilateral cartilage inferiorly. The posterior edge of the vomer forms the posterior free edge of the septum.

Histology :

The mucoperichondrium of the septum is separate from the mucoperiosteum that overlying the maxillary crest, reflecting its embryological development. The mucous membrane is predominantly respiratory with a small area of olfactory epithelium superiorly adjacent to the cribriform plate. Respiratory epithelium is composed of ciliated and non-ciliated pseudotratified columnar cells, basal pluripotent stem cells and goblet cells.

Seromucinous glands are found in the submucosa and are more important in mucus production in the nasal cavity than the goblet cells which are more numerous in the sinuses. The olfactory epithelium spreads down from the cribriform plate on to the upper septum.

Blood supply :

The external and internal carotid arteries are responsible for the rich blood

supply to the nose. The sphenopalatine artery (branch of the maxillary artery and thus external carotid artery) supplies the posteroinferior septum. The greater palatine artery (also a branch of the maxillary) supplies the anteroinferior portion entering the nasal cavity via the incisive canal. The superior labial branch of the facial artery contributes anteriorly, in particular to Kiesselbach's plexus, which is composed of unusually long capillary loops and is situated in little's area on the anterior septum – a common source of epistaxis. The internal carotid artery supplies the septum superiorly via the anterior and posterior ethmoidal arteries and also contributes to Kiesselbach's plexus.

The cavernous venous system drains via the sphenopalatine vessels into the pterygoid plexus posteriorly and into the facial veins anteriorly. Superiorly the ethmoidal veins communicate with the superior ophthalmic system and there may be direct intracranial connections through the foramen caecum into the superior sagittal sinus.

Nerve supply :

The maxillary division of the trigeminal nerve provides sensory supply to the nasal septum. The nasopalatine nerve supplies the bulk of the bony septum, entering the nasal cavity via the spheno-palatine foramen. The anterosuperior part of the septum is supplied by the anterior ethmoidal branch of the nasociliary nerve and a smaller anterioinferior portion receives a branch from the anterior superior

alveolar nerve. The postero inferior septum also receives a small supply from the nerve to the pterygoid canal and a posterior inferior nasal branch of the anterior palatine nerve.

The sensory nerves are accompanied by post ganglionic sympathetic fibres to blood vessels and parasympathetic secretomotor fibres pass to glands with the branches from the pterygopalatine ganglion.

The olfactory epithelium covers the inferior surface of the cribriform plate spreading down to cover a variable area on the upper septum and adjacent lateral wall, over the medial surface of the superior concha.

Lymphatic Drainage

The anterior septum drains with the external nose to the submandibular nodes while the posterior septum drains into the retropharyngeal and anterior deep cervical nodes posteriorly.

The Lateral Nasal Wall

The inferior meatus is that part of the lateral wall of the nose lateral to the inferior turbinate. It is the largest meatus, extending almost the entire length of the nasal cavity. The meatus is highest at the junction of the anterior and middle third. The naso-lacrimal duct opens into the inferior meatus the opening being covered by small folds of mucosa (Hasner's valve). It can be identified in life by gentle massage of the lacrimal sac at the medial canthus.

Inferior Turbinate :

This structure is composed of a separate bone, the inferior concha which has an irregular surface, perforated and grooved by vascular channels to which the mucoperiosteum is firmly attached. The bone has a maxillary process which articulates with the inferior margin of the maxillary hiatus. It also articulates with the ethmoid, palatine and lacrimal bones, completing the medial wall of the nasolacrimal duct. The inferior concha has its own ossification centre which appears around the fifth intrauterine month.

The turbinate possesses an impressive submucosal plexus with large sinusoids under autonomic control which provides the major contribution to nasal resistance. The turbinate is covered by respiratory epithelium, with a high number of goblet cells which decrease in density towards the posterior end (Tos and Morgensen, 1979).

Middle Meatus :

The middle meatus is that portion of the lateral nasal wall lying lateral to the middle turbinate. It receives drainage from the frontal, maxillary and anterior ethmoidal sinuses. In the past when radical surgery was predominantly used for most pathology this was of less significance. The advent of endoscopic sinus

surgery has led to an increased interest in the detailed anatomy of the region and a need for consensus in terminology.

The endoscopist's interest is mainly in the middle meatus since the frontal sinus, anterior and middle ethmoidal cells and the maxillary sinus drain here. The region of the middle meatus with the anterior and middle ethmoids has been termed as the osteo-meatal complex by Naumann. On removing the middle turbinate one can clearly see certain structures in the middle meatus, i.e. anteriorly, there is a hook shaped uncinate process behind which lies a semimunar groove called the hiatus semilunaris. This groove separates the uncinate process from the bulla ethmoidalis which is just behind. The hiatus semilunaris is really a deep groove and its deepest part is called the infundibulum. Anterior to the frontal recess is the prominence of the agger cells. This area is easily identified on the lateral nasal wall, just in front of the middle turbinate. Exenteration of these cells is often necessary to expose the frontal recess.

The maxillary ostium lies just superior to the inferior turbinate. The part of the lateral nasal wall just above the inferior turbinate, anterior and posterior to the maxillary ostium consists only a double layer of mucosa with no intervening bone. These are termed as the anterior and posterior fontanelles. The bulla ethmoidal cell is the most constant ethmoidal cell, and along with its surrounding cells constitutes the middle ethmoidal cells which opens either in to the infundibulum or

on the medial wall of the bulla itself. The middle ethmoidal cells are bounded superiorly by the ethmoidal roof. The anterior and posterior ethmoidal arteries traverse the ethmoidal roof in the coronal plane from the orbit to the nose. They are important landmarks as they denote the upper limit of dissection. The lateral part of the roof of the ethmoid is fairly thick and at a higher level, whereas the medial part of the roof is thin and slopes downwards to join the cribriform plate. The cribriform plate is also very thin and may be easily perforated.

Laterally middle ethmoidal cells are related to the lacrimal bone and the lamina papayracea of the ethmoidal bone forming the medial orbital wall, which is very thin and delicate, and may also be accidentally perforated during dissection. Posteriorly the middle ethmoidal cells are bounded by a bony partition, the basal or ground lamella which corresponds to the bony attachment of the posterior end of the middle turbinate. It should be noted that although the middle turbinate runs in the sagittal plane, its posterior bony attachment curves laterally so that the ground lamella lies in the coronal plane. Posterior to the ground lamella lie the posterior ethmoidal cells, which are related superiorly to the dura, postero-inferiorly to the sphenoid sinus and laterally to the orbital apex and the optic nerve. Some times the optic nerve canal may produce a bony convexity in the lateral wall of the posterior ethmoidal cells. Posterior ethmoidal cells vary from one to seven in number and usually open by one orifice in the superior meatus.

Two important points must be stressed here. First, the posterior part of the lateral wall of ethmoids curves medially. Hence, as the surgeon proceeds deeper in to the ethmoids the direction of his dissection should turn medially to guard against an accidental damage to the optic canal. Secondly, it must be clearly understood that the sphenoid sinus has a posteo-infero-medial relation to the posterior ethmoidal cells. When proceeding with the dissection from the posterior ethmoidal cells in to the sphenoid sinus, the surgeon will have to angle his instruments in an inferomedial direction.

The sphenoid sinuses show variations in size and shape, as well as position and direction of the inter-sphenoidal septum. The anterior wall of the sphenoidal sinus is approximately 7 cm from the anterior nasal spine. The roof of the sphenoidal sinuses presents a convex bulge corresponding to the roof of the pituitary fossa. The lateral sphenoid wall in its upper part is related to the optic nerve. Often, the bony canal of the optic nerve produces a bulge in the lateral wall. In about 4% of subjects, there may be a bony dehiscence in this canal marking the nerve more prone to injury during surgery. More posteriorly and inferiorly, the lateral wall of the sphenoid sinus is related to the internal carotid artery.

NASAL POLYPS

Polypus, Greek- *MANY FOOTED*

Polyps are abnormal growths. It is an inflammatory condition of nasal lining epithelium that produces diffuse swelling inside the nose. Eventually polps attain extensive dimensions that causes complete nasal obstruction.

Symptoms of nasal polyp :

1. Nasal obstruction
2. Anosmia / hyposmia
3. Facial pressure / fullness
4. Pain is not typically seen
5. Rarely bleeding can occurs

6. Headache is usually due to accompanying sinusitis
7. Severe post nasal drip.

Diagnosis of polyp :

Nose is not a familiar place for most physician. Hence for any nasal compliant, an ENT evaluation is a must. Advanced equipments like endoscopes clearly visualizes the polyp. Radiological evaluation like CT scan helps to establish the presence and extend of the polyps.

Aetiology of polyp formation :

1. Allergic fungal sinusitis – true allergy to fungus, usually aspergilus.
2. Bernoulli's phenomenon
3. Vascular instability
4. Human papilloma virus seen associated with inverted papilloma, mainly strains 6 and 11.
5. Staphylococcal enterotoxin – believed to cause increased production of IgE that leads to polyp formation. Biofilm infection of staphylococcus is also hypothesized to produce polyps.
6. Collegen abnormality of basement membrane
7. Samster's triad
8. Cystic fibrosis

Treatment of Nasal polyp

Initiate management of polyp, includes anti inflammatory medication – Corticosteroids. Topical medication are usually preferred. Only rarely, oral steroids are prescribed.

Once the specific cause is known treatment is initiated for the underlying cause. Example addition of anti leukotrienes in Samster's triad helps to treat asthma, anti fungal medication in fungal etiology etc.

Surgical resection of polyp is a potential cure for polyp. But in the absence of anti inflammatory medication. Surgical results are always poor. So is it in the absence of proper antibiotic control.

FUNCTIONAL ENDOSCOPIC SINUS SURGERY

Introduction :

The treatment of nasal and sinus diseases has been revolutionized by the introduction of the nasal endoscope. The pioneering work of Messerklinger has lead to an understanding of the physiology of the nose and sinuses and also recognizing the mucociliary transport mechanism of the nose and sinus mucosa. The mucociliary transport of mucus etc. occurs in a definite genetically predetermined pattern. The transport is always toward the natural ostium and a dependent opening like the intranasal antrostomy does not necessarily help in drainage. Mucosal contact between adjacent areas, eg. in the middle meatus ,arrests the mucociliary transport leading to stagnation and subsequent infection. This has shown that in most instances, the pathology is not primarily in the larger sinuses but is secondary to impaired drainage caused by disease in the ethmoidal infundibulum blocking their natural ostia in the middle meatus Interruption of ventilation and drainage caused by ostial obstruction leads to stagnation of the

secretory product and damage to the ancillary function of the respiratory epithelium with consequent inflammation. The inflamed mucosa in turn contributes to the ostial obstruction, thus completing the cycle.

There are numerous narrow clefts in the anterior ethmoidal cells and there are many anatomical variations that can easily narrow these clefts thus predisposing to recurring infections, firstly in the ethmoids and eventually in the larger sinuses. The Messerklinger's concept of the treatment of diseases of the nose and sinus is based largely on the diagnosis of these areas of obstruction, by the use of a Diagnostic Nasal endoscopy and CT scans. Once the cause of the problem is identified clearly, treatment can be directed at these critical areas in the ethmoidal clefts and not at the larger sinuses.

With the Messerklinger's technique, the two advantages are 1) radical procedures can be avoided and 2) even in cases of massive diseases, limited procedures usually prove sufficient.

However, it is now increasingly obvious that the principles of functional endoscopic sinus surgery and the Meserklinger's technique ie. attempting to reverse pathophysiological processes by conservative surgery in defined areas dictated by disease are applicable only in chronic sinusitis and acute recurrent sinusitis. The functional approach is not applicable to all diseases of the nose and sinuses. In addition the horizons of nasal surgery have grown far beyond FESS

and now include various orbital and anterior skull base procedures.

Basic Principles and surgical techniques :

The techniques of endoscopic sinus surgery vary with the surgeon and also the type of surgical procedure.

The use of 0 degree wide angled endoscope for most of the endoscopic procedure. A 30 or 70 degree endoscope is used only after 3 major part of the dissection has been completed in order to help visualize the corners and other areas not seen with the 0 degree endoscope.

The fundamental steps of Ethmoidal Dissection performed according to the Messerkillger's technique include the following.

1. Infundibulotomy

This procedure is performed

To gain access to ethmoidal infundibulum

To identify the natural ostium of the maxillary sinus

To expose the frontal recess.

With a Freer elevator gently medialise the middle turbinate. Using a ball probe the free margin and the attachment of the uncinate process are palpated. The hiatus semilunaris is identified. Using a 0 degree telescope and a sickle knife, the first step is to make an incision in the shallow groove between the uncinate process and the lacrimal crest. The incision starts superiorly at the level of the

middle turbinate and goes downwards following the curve of the uncinate process till just above the inferior turbinate. Perforate the insertion of the uncinate process at the attachment of the middle turbinate and with a gentle sawing motion follow the insertion of the uncinate inferiorly. With the Blakesley forceps grasp the uncinate process and with a twisting motion avulse first the inferior aspect of the uncinate followed by avulsion of the superior attachment. The infundibulum is opened up now and the bulla ethmoidalis can be visualized and the surgeon has access to the ethmoidal air cells.

2. Middle Meatal Antrostomy :

This procedure is performed

To identify the natural maxillary ostium

To widen the ostium posteriorly to form a large middle meatal antrostomy

After complete removal of the uncinate process, the ethmoidal bulla and maxillary ostium are visible. The natural ostium lies at the junction of the anterior and inferior wall of the ethmoidal bulla. If the ostium is incompletely visualized take a curette and remove any residual portion of the uncinate process. Examine the posterior frontanelle for any accessory ostium. If present, the accessory ostium is connected to the natural ostium using a backbiting forceps. If there is no accessory ostium, a scissors is usd to cut and widen the natural ostium posteriorly. The same backbiting forceps can be used to remove the inferior margin of the

antrostomy and the upbiting Blakesley forceps to remove the superior portion of the frontanelle adjacent to the ostium.

3. Anterior Ethmoidectomy

This procedure is performed

To remove the ethmoidal bulla and ethmoidal cells anterior to the ground lamella.

To identify the anterior skull base and the anterior ethmoidal artery.

The anterior wall of the ethmoidal bulla is entered with the tip of a straight forceps. The inferior and medial wall is completely removed while maintaining the posterior wall intact. The lateral wall of the ethmoidal bulla is formed by the lamina papyracea which forms the lateral boundary of the dissection. The skull base is defined anteriorly. There may be some cells superior to ethmoidal bulla. As the skull base begins to curve superiorly it forms the ethomoidal dome and the anterior ethmoidal bulla is fused in most instances to the ground lamella of the middle turbinate, separating the anterior and posterior ethmoidal cells.

The roof of the ethmoids which separates the air cells from the dura curves upwards as it goes laterally. Medially it is thin and dips down rather sharply to join the cribriform plate. The diseased cells in this region can be removed with upward biting Blakesley forceps, the tip of which should always be directed slightly laterally to avoid accidental perforation of the ethmoidal roof or cribriform

plate. when removing the cells near the lamina papyracea, which forms the lateral boundary, it is better to use the side of the forceps rather than the tip to prevent accidental perforation. The lamina can be identified because it has a slightly yellowish tinge. The ground lamella separates the anterior ethmoidal cells which are situated around the frontal recess and anterior to the anterior ethmoidal artery are removed using a 30 degree scope and upward biting forceps. Sometimes, it is necessary to open the agger nasi cells to get an adequate view of this area. After clearing the anterior cells it is possible to see the opening of the frontonasal duct. This should be cleared by removing the diseased mucosa surrounding it.

4. Posterior Ehtmoidectomy :

This produce is performed

1. To exenterate the posterior ethmoidal cells
2. To identify the skull base, posterior ethmoidal artery, anterior sphenoidal wall, superior turbinate and sphenoidal ostium.

The posterior ehtmoidal cells are entered through the postero infero medial part of the ground lamella. The septae of the posterior ethmoidal artery which lies several millimeters anterior to the anterior wall of the sphenoid sinus is identified. The mucosa of the anterior wall of the sphenoid sinus is removed. It is slightly bluish in colour in contrast with the yellowish colour of the medial or orbital wall and skull base. The skull base descends inferiorly as it moves in an anterior to

posterior direction. The boundaries of the posterior ethmoidal cells are posteriorly the anterior sphenoid wall, laterally the lamina papyracea, superiorly the skull base and the superior turbinate medially. The optic nerve can indent into the posterior ethmoidal sinus cells in this region. Remember that the path through the ethmoid does not lead to the anterior wall of the sphenoid sinus but further superiorly and laterally.

5. Sphenoidotomy :

This procedure is performed

To enter the sphenoid sinus by removing the anterior wall and deal with the disease inside.

To study the anatomy of the sphenoid sinus in detail.

The anterior wall of the sphenoidal sinus is identified with certainly by the following facts :

The anterior wall is about 7 cm from the anterior nasal spine at 30 degrees from the floor of the nose.

The anterior wall of the sphenoid sinus can be entered by a straight suction approx 1 cm above the choana.

6. Frontal Recess Surgery :

This procedure is performed

To expose the frontal recess

To identify the frontal sinus ostium

To establish drainage for the frontal sinus

To establish drainage for the frontal recess

Anteriorly - Aggernasi

Posteriorly - Anterior wall of ethmoidal bulla

Medially - Middle turbinate

Laterally - Lamina papyracea

The skull base that has been identified posteriorly is followed anteriorly till the anterior ethmoidal artery is identified. This forms an important landmark in the posterior boundary. The frontal sinus opening can be visualized by dissecting upwards towards the skull base between middle turbinate medially and residual uncinate process laterally. Agger nasi cells have to be completely removed. The infundibulotomy incision is extended in to the Agger nasi cells just lateral to the insertion of the middle turbinate on the lateral nasal wall. This provides better access to the Agger nasi cells giving direct access to the frontal opening. Using the Blakesley forceps any lamellae from the Agger nasi cells which will be just anterior to the frontal opening are remove. After identifying the frontal opening the anterior wall of the recess, which also forms the posterior wall of the Agger

nasi, is removed. The posterior table of the frontal sinus will be clearly visible.

Cells within frontal recess also have to be removed completely. Residual uncinate process has to be removed. The mucos membrane of the frontal sinus ostium is preserved. Otherwise stenosis of the ostium of the frontal sinus may occur.

Pearls and Pitfalls in Endoscopic Sinus Surgery :

- Always use the 0 degree endoscope while doing surgery. The 30 or 70 degree nasal endoscopes are used only in special situations. Eg. Involvement of the frontal recess, for enlargement of the maxillary sinus ostium.
- Savlon is a good antifogging agent for the tip of the scope.
- It is important to hold the tip of the endoscope a good distance from the operation site.
- It is not always necessary to resect the middle turbinate prior to the endsocopic procedure. It is enough to gently displace it medially.
- When resecting the uncinate process the tip of the knife is used in a plane parallel to the medial wall of the orbit.
- When removing the uncinate process it is important to do so without damage to the adjacent mucosa on the middle turbinate.
- Identify the maxillary ostium after removal of the uncinate process.

- The ethmoidal bulla should be opened as far medially as possible. It is important to remember that the bulla is sometimes not pneumatised and in these cases opening in a lateral direction of the bulla leads straight into the orbit.
- Open the ground lamella as far medially and inferiorly as possible.
- The dura and periorbita are viewed as natural barriers and should be preserved always.

MICROBIOLOGY

STAPHYLOCOCCUS :

Staphyle in Greek means *"bunch of grapes*" Kokkas meaning *"a berry"*

Staphylococci are gram positive cocci that occurs in grape like cluster. They are ubiquitious and are most commonly associated with localized suppurative lesions. They also occur as normal flora in human beings.

Staphylococci were first observed by Von Recklinghausen in 1871. Sir Alexander Ogston, a Scottish surgeon, gave it the name "staphylococcus". Rosenbach named staph albus and staph aureus. Passet described a third variety staph. Citreus.

Staphlococci are classified into 32 species and 15 subspecies based on chemical composition of cell wall components and properties. Besides staphylococcus aureus 3 coagulase negative species – staph epidermidis, staph hemolytics and staph saprophytics were also described.

STAPHYLOCOCCUS AUREUS :

Spherical cocci, 1um in diameter, grape like cluster. Cluster formation is due to cell devision in 3 planes. On nutrient agar slope the growth is

characteristically has “Oil pain appearance”.

Staph aureus strains exhibit the following :

1. Coagulase positive
2. Greater biochemical activity, ferments mannitol
3. Produce clear hemolysis on blood agar
4. Produce golden yellow pigment
5. liquefy gelatin
6. Produce phosphatase
7. Reduces tellurite and produces black colour
8. Produces thermostable nucleases

Staphylococci were uniformly resistant to pencillin. Resistance to penicillin is of 3 types.

a) Production of beta lactamases

b) Change in bacterial surface receptor

c) Development of tolerance to penicillin.

Virulence factors of staphylococci are

Cell associated polymers, cell surface proteins (protein A and clumping factor), extracellular enzymes (mainly coagulase, lipases, nucleases) and Toxins

(like alpha, beta hemalysins, leucocidin, enterotoxin).

COAGULASE NEGATIVE STAPHYLOCOCCI:

They constitutes a major component of normal flora of human body. 3 main bacteria are staph, epidermidis, staph. hemolytics and staph saprophyticus.

Staph. Epidermidis :

Non pathologic ordinarily but can cause disease. Common cause of stitch abscess. Also predilection for growth on prosthesis and implants. Hospital strains are multi drug resistant.

Staph Saprophyticus :

Usually seen in normal skin, periurethral area causing urinary tract infection in sexually active young women. Infecting strains are usually sensitive to common antibiotics. Staph sapraphyticus is novobiocin resistant and is rarely associated with human infections.

REVIEW OF LITERATURE

Bacteriology of paranasal sinuses in healthy volunteers, (Sobin J, Engquist S, Nord CE)

"Normal respiratory flora in adults includes Coagulase negative staphylococci, Staph aureus and Corynebacterium diphtheria"

Endoscopically guided culture in Ethmoidal sinuses (Nadel DM, Large DC, Kennady DW)

"Prospective study of microbiology of ethmoidal sinuses following FESS in 113 patients were carried out. Nasal swab was collected after complete mucosalization. Of the 113, 67 (59.3%) had positive culture. Most common were gram positive cocci and most common bacteria – staphylococci.

Distribution of Bacteria :

64 out of 67 were staphylococci

Coagulase negative staph	-	36
Staph aureus	-	27
MRSA	-	1

Susceptibility of pathogens isolated from community acquired respiratory tract infections to commonly used antimicrobial agents(JacobsMR, Felmingham D,

AppelbaumPC)

Incidence of S.aureus, staph. Epidermidis , pseudomonas and other gram negative bacteria were higher in chronic rhinosinusitis. This presents a problem due to increasing antibiotic resistance for these organisms.the end result is a reduced number of oral antibiotic options leading to alternative delivery systems

Assessment of trends in Antimicrobial resistance in chronic rhinosinusitis (with and without polyps)-(Journal of royal college of Edinberg and Ireland)

Cross sectional review of contemporary and temporal patterns of antimicrobial resistance in nasal cavity were carried out. Retrospective microbiology data from 2001 – 2005 were collected. 701 bacterial isolates were analysed. It was found that antibiotic resistance increased for commonly used drug in the institution namely Erytheromycin and Methicillin. Resistance for sulphamethoxazole, remained the same. But resistance to gentamicin, which was the least used, decreased."

MATERIALS AND METHODS

Study was carried out during the period between July 2008 to September 2009 at the Department of Otorhinolarygology of Government Rajaji Hospital attached to Madurai Medical College, Madurai after receiving permission fro the

Ethical Committee.

Patients subjected to the study were those with sinonasal polyposis posted for endonasal endoscopic sinus surgeries after taking anaesthesia fitness. Nasal swabs of patients were taken 1 day prior to surgery.Swabs were taken from nasal cavity floor, lateral wall and from the surface of the polyp on both sides. Post operative swabs were taken on the 10^{th} post operative day.Post operative swabs were from the nasal cavity floor and post operative middle meatus Revision FESS cases were not taken up for study.

Swabs obtained from the patients were sent to the microbiology department of Madurai Medical College for bacterial culture and sensitivity after proper labeling with a request form mentioning the pre or post operative status of the sample. Bacterial culture was done for all the samples made available. Sensitivity was tested for the most commonly used antibiotics in our department .(ampicillin, gentamicin,cotrimoxazole, erytheromycin ,cephalexin, cefotaxime, ceftriaxone,cloxacillin, doxycycline and ciprofloxacin.

Results obtained from the study were compiled and compared with those done at higher centres.

RESULTS

Table – 1

Age Distribution

Age in years	No.of patients	Percentage
< 20 years	6	12
21 – 30	14	28
31 – 40	10	20
41 – 50	15	30
> 50	5	10
Total	50	100

Out of 50 patients, maximum number of patients were from 41 – 50 years age group and followed by 21-30yrs group. Together this group constituted 58% of all the cases. Youngest patient was 15 yrs old and the oldest 65 yrs old.

Table – 2

Sex Distribution

Sex	No.of patients	Percentage
Male	34	68
Female	16	32
Total	50	100

Major of patients were males. Major reasons for which was willingness for surgery was high among males. Medical line of management was acceptable to many patients mostly females even though chances of complete remission of symptoms were explained to be remote.

Table – 3

Pre operative Bacterial Culture

Culture	No.of patients	Percentage

No Growth	18	36
Coagulase negative staphylococcus(CONS)	21	42
Staph aureus	11	22
Total	50	100

Preoperative bacterial culture was positive in 32 out of the 50 cases with rest of the culture showing no growth.21 cases had coagulase negative staphylococcus and rest had staphylococcus aureus culture. No bacterial culture was seen .

Table – 4

Coagulase negative staphylococcus[CONS]-(pre-operative)

Antibiotics	Resistant	Sensitive
Ampicillin	21	0
Gentamicin	21	0
Cotrimoxazole	8	13
Ciprofloxacin	0	21
Cefotaxime	21	0
Doxycycline	4	17
Cephalexine	21	0
Ceftriaxone	7	14
Erytheromycin	0	21

Cloxacillin	8	13

CONS was seen in 21 cases. All cases had resistance to ampicillin, gentamicin, cefotaxime and cephalexine. ceftriaxone resistance was seen only in 7 out of the 21 cultures. Erytheromycin and ciprofloxacin were sensitive in all cases.

Table – 5

Staphylococcus aureus(pre-operative)

Antibiotics	Resistant	Sensitive
Ampicillin	11	0
Gentamicin	11	0
Cotrimoxazole	0	11
Ciprofloxacin	0	11
Cefotaxime	0	11
Doxycycline	0	11
Cephalexin	0	11
Ceftriaxone	0	11
Erytheromycin	0	11
Cloxacillin	0	11

Staphylococcus aureus cultures were found to be resistant only to ampicillin and gentamicin. Sensitivity to other antibiotics were 100% with few of them showing high sensitivity.

Table – 6

Post operative Bacterial Culture

Culture	No.of patients	Percentage
No Growth	20	55.5
CONS	9	25
Staph aureus	7	19.5
Total	36	100

Out of the 50 cases post operative bacterial culture was done in 36 cases. 20 cases had no growth and 16 were positive. 9 out of the 16 were coagulase negative staphylococcus and rest were staphylococcus aureus.

Table – 7

Coagulase negative staphylococcus[CONS]-(post operative)

Antibiotics	Resistant	Sensitive
Ampicillin	9	0
Gentamicin	9	0
Cotrimoxazole	0	9
Ciprofloxacin	0	9
Cefotaxime	8	1
Doxycycline	0	9
Cephalexin	9	0
Ceftriaxone	6	3
Erytheromycin	0	9
Cloxacillin	0	9

9 cases of post operative culture showed coagulase negative staphylococcus . Ampicillin, gentamicin and cephalexin resistance was seen in all cases. Interestingly one case of cefotaxime sensitivity was seen. Ceftriaxone was resistant in 6 out of 9 cases.

Table – 8

Staphylococcus aureus(post operative)

Antibiotics	Resistant	Sensitive
Ampicillin	7	0
Gentamicin	7	0
Cotrimoxazole	0	7
Ciprofloxacin	0	7
Cefotaxime	0	7
Doxycycline	0	7
Cephalexin	0	7
Ceftriaxone	0	7
Erytheromycin	0	7
Cloxacillin	0	7

Staphylococcus aureus culture was positive in 7 cases, all of which showed resistance to ampicillin and gentamicin. Rest of the tested antibiotics had excellent response to staph.aureus in all cases.

DISCUSSION

During the study period from July 2008 to September 2009, 50 patients with nasal polyps were taken up for the study. Majority of the patients were in the age group is 21 – 50 yrs. Males constituted 68% of the total study group. All patients had anaesthesia fitness for surgery..

Preoperative bacterial culture of all the patients were taken. 18 of them showed no growth, 21 were positive for *Coagulase negative staphylococcus*(CONS) and 11 for *Staphylococcus aureus*.

CONS showed high resistance for ampicillin, gentamicin, cefataxime and cephalexine in all culture. High sensitivity for ciprofloxacin and erytheromycin. Varying results for cotrimoxazole, doxycycline and ceftriaxone,with more sensitive strains than resistant. Staphylococcus aureus was resistant only due to ampicillin and gentamicin.All other antibiotics were sensitive in all cases.

Post operatively bacterial culture was taken for 36 cases. 20 of them were negative, 9 cultures were positive for CONS and 7 for Staphylococcus aureus.

CONS showed complete resistance for ampicillin, gentamicin and cephalexine. Only 1 case was sensitive for cefotaxime. Sensitivity was there for cotrimoxazole,ciprofloxacin,doxycycline, erytheromycin and cloxacillin in all cases. Staphylococcus aureus was resistant only due to ampillicin and gentamicin.

Ampicillin, gentamicin, cefotaxime and ceftriaxone were most commonly used intravenous antibiotics among the tested. These were also the most commonly used antibiotic in almost all surgical procedures including endoscopic sinus surgeries. Resistance was found to these antibiotics in a majority of bacterial culture irrespective of being pre or post operative.

CONCLUSION

Most common pre operative bacterial species culture was ***Coagulase negative staphylococcus*** followed by ***Staphylococcus aureus***.

Most common post operative bacterial species culture was ***Coagulase negative staphylococcus and Staphylococcus aureus***.

Coagulase negative staphylococcus were found to be resistant to ampicillin, gentamicin, cefotaxime and cephalexin. Sensitivity to ciprofloxacin and erytheromycin was found in all cases.

Staphylococcus aureus was resistant to ampicillin and gentamicin only.

No major difference in the antibiotic sensitivity was seen in the cultures . However resistance to the commonly used intravenous antibiotics were seen in almost all cultures whether pre operative or post operative.

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PROFORMA

Name : Age : Sex : S.NO.

Place of residence : Occupation :

Socioeconomic status : Hospital stay :

HISTORY :

A) Complaints: Duration :

1.

2.

3.

B) H/o Present illness :

Nose : symptoms Duration :

i) Nasal obstruction R/ L / B

ii) Nasal discharge R/L/B

iii) Headache

iv) Facial pain UL / BL

v) Nasal bleeding R/L/B

vi) Change of voice

vii) Smell disturbance

viii) Nose deformity

EYE :

i) Proptosis

ii) Pain

iii) Watery Eyes

iv) Blurring of vision

v) Diplopia

ORAL CAVITY

i) Pain

ii) Palatal ulcer

iii) Mouth ulcer

CRANIAL NERVES :

i) Anosmia

ii) Loss of vision

iii) Diplopia

iv) Ophthalmoplegia

v) Trigeminal Anaesthesia

vi) Facial palsy

vii) Nasal regurgitation

Miscellaneous : HOH / Loss of weight and Appetite

Past History :

1. Previous treatment

a) Drugs - Steroid therapy - Duration

b) Surgery - Endoscopic / External approach

Combined

2. H/o Immuno suppression

3. H/o Diabetes / Hypertension / IHD

PERSONAL HISTORY

Smoking / alcoholic / Snuff / Gardening

FAMILY HISTORY

Occupational History :

i) General examination :

Build

Nourishment

Anaemia

Weight / BP / Temperature

SYSTEMIC EXAMINATION :

Cardio vascular system : Heart sounds / murmur

Respiratory system :

Abdomen :

Central Nervous system :

LOCAL EXAMINATION :

1. Nose : Skin

External contour

Nasolabial fold

Anterior Rhinoscopy :

Septum Deviated to R/L/Midline

Mass

Probing

Nasal airway

Bleeding on touch

Nasal discharge

Posterior Rhinoscopy :

Mass

Discharge

Choanae / Eustachian tube

2. ORBIT

Proptosis

Acuity of vision

Movement of the eye ball

Lacrimation

Oedema of the eyes

Hypertelorism

3. ORAL CAVITY

Oral mucosa

Teeth

Hard & Soft palatal ulcer

4. EXAMINATION OF CRANIAL NERVES

5. EAR

6. THROAT

Indirect laryngoscopic examination

INVESTIGATIONS :

Routine blood and urine tests

Blood sugar / urea / Serum creatinine

RADIOLOGICAL INVESTIGATIONS

CT scan of Nose paranasal sinuses

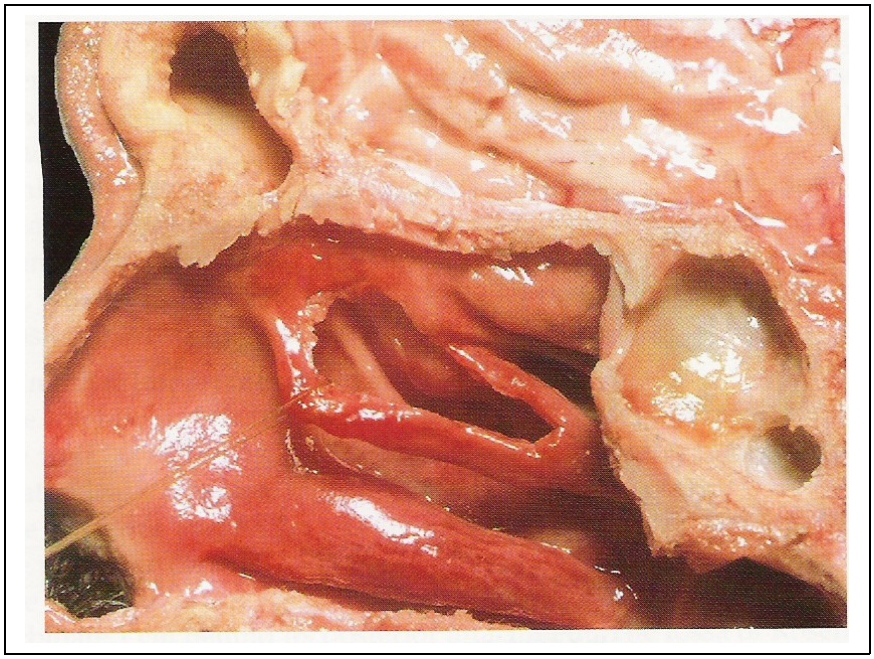
DIAGNOSTIC NASAL ENDOSCOPY :

PROVISIONAL DIAGNOSIS :

KEY TO MASTER CHART

M	-	MALE
F	-	FEMALE
CONS	-	COAGULASE NEGATIVE STAPHYLOCOCCUS
St.aureus	-	STAPHYLOCOCCUS AUREUS
A	-	AMPICILLIN
G	-	GENTAMICIN
CO	-	COTRIMOXAZOLE
DO	-	DOXYCYCLINE
CEPH	-	CEPHALEXINE
CEF	-	CEFOTAXIME
CEFT	-	CEFTRIAXONE
CLOX	-	CLOXACILLIN

OSTEOMEATAL UNIT



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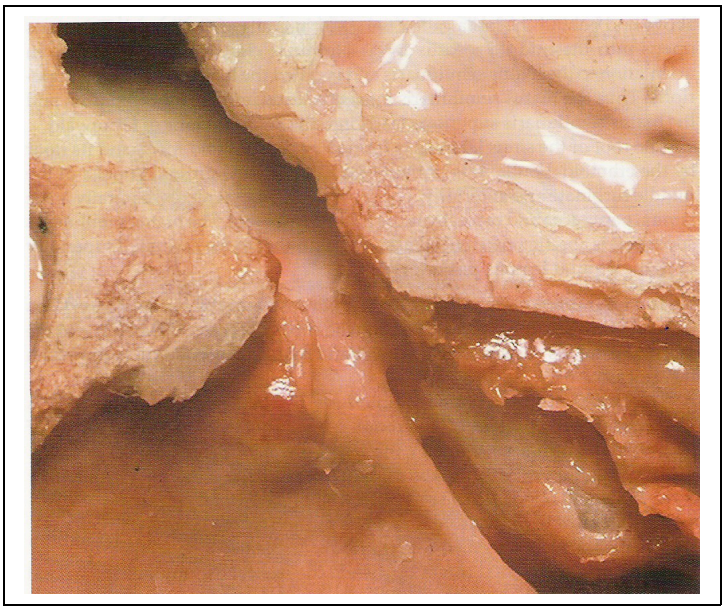
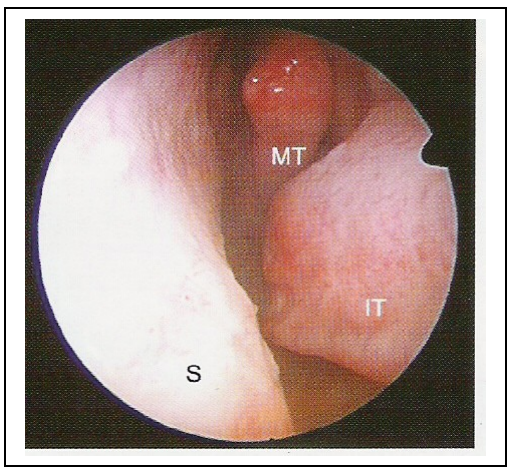


SAGITTAL SECTION OF PARANASAL SINUSES



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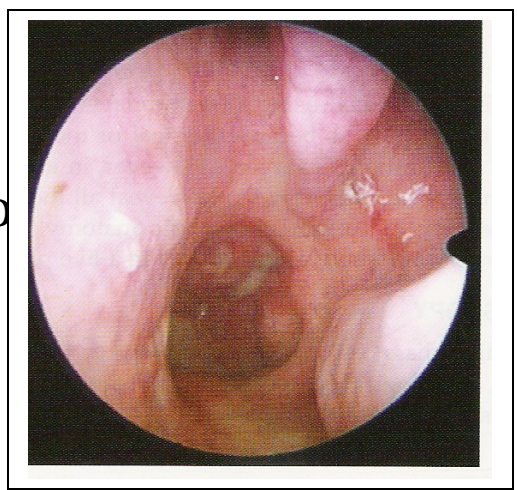

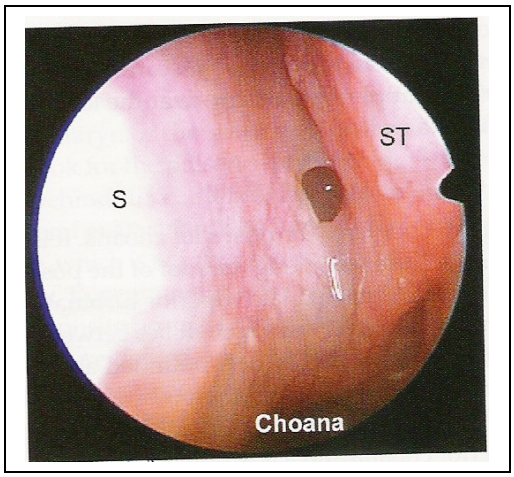
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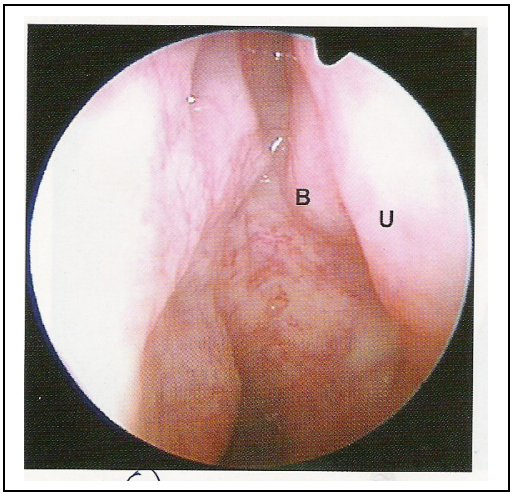
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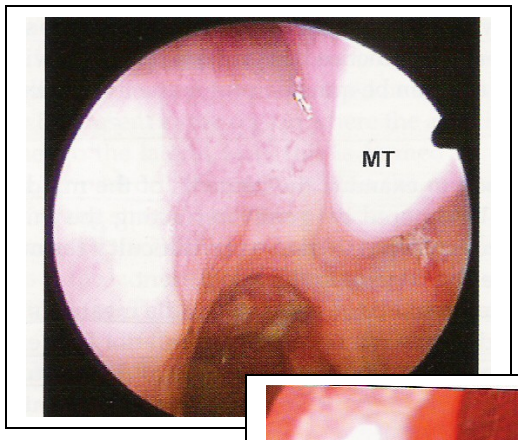
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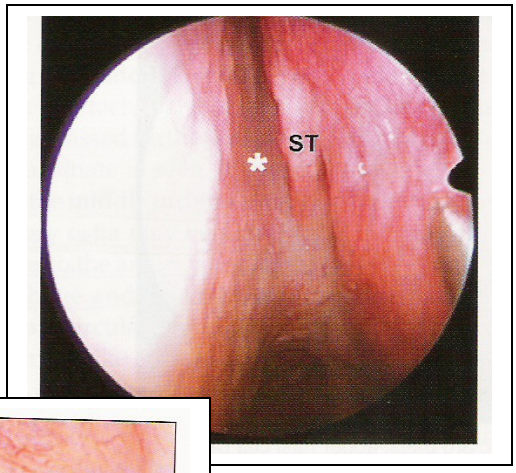
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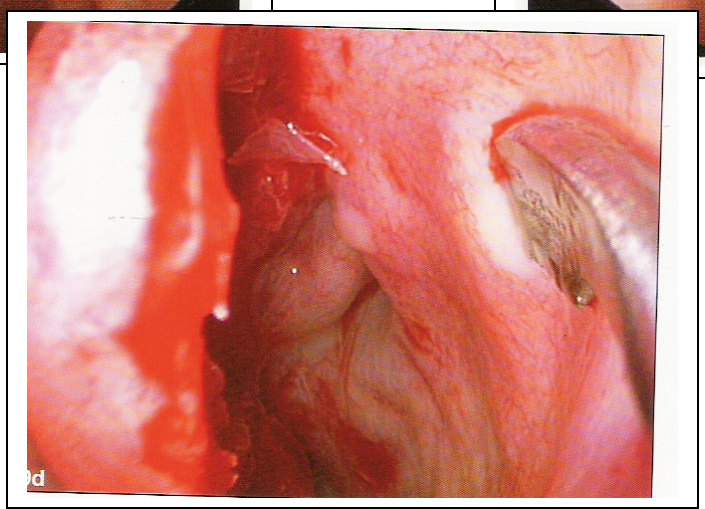
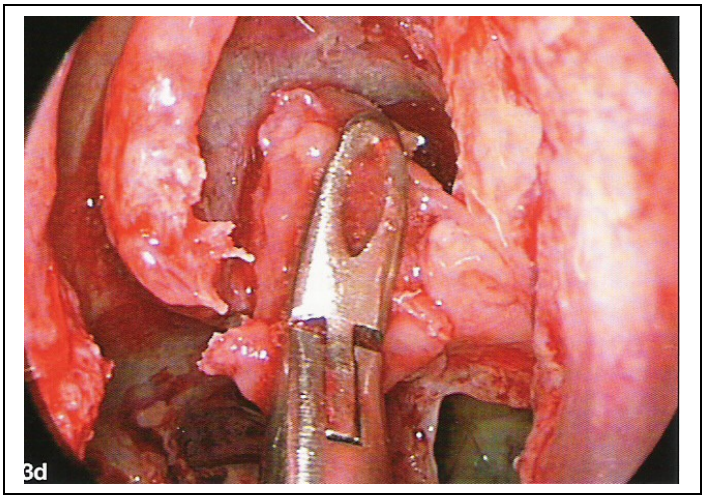
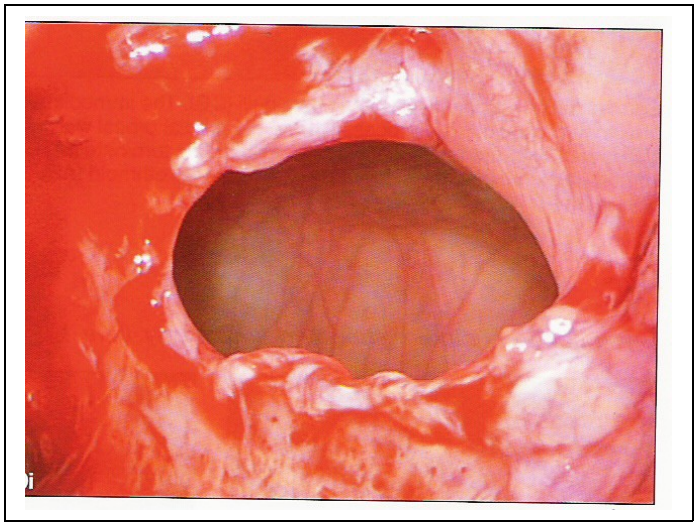


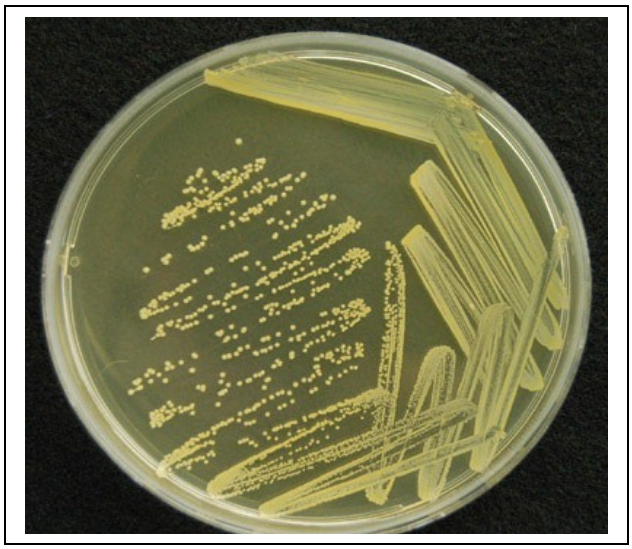
REMOVAL OF BULLA



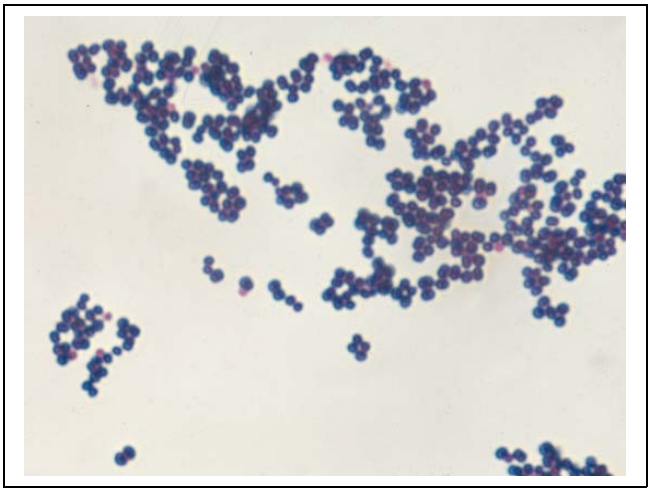
WIDENED MAXILLARY OSTIUM



STAPHYLOCOCCUS AUREUS



MICROSCOPIC PICTURE



COAGULASE NEGATIVE STAPHYLOCOCCUS

MICROSCOPIC PICTURE

is